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A Record of War and Peace

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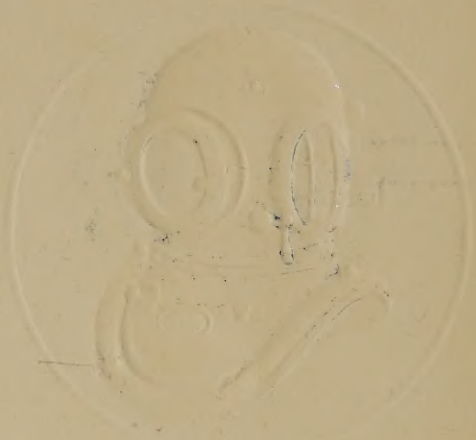

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A RECORD
OF WAR AND PEACE
1819-1946

Siebe, Gorman & Company Limited

"Neptune" Works, Davis Road, Tolworth, Surrey

DIRECTORS :

SIR ROBERT H. DAVIS, F.R.S.A., *Managing Director.*

R. W. GORMAN DAVIS, M.A. (CANTAB.) A.M.I.MECH.E., *General Manager.*

W. ERIC DAVIS, *Secretary.*

[1946]

TO THE MANY who, under water, on land, and in the air, used our apparatus during the victorious War of 1939-1945, this brochure is gratefully dedicated.

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A RECORD OF WAR AND PEACE 1819-1946

The Founder of Siebe, Gorman & Co., Ltd.

AS the smoke of battle drifted from the field of Waterloo in 1815 and the weary protagonists turned their backs on the slaughter a young Artillery Officer marched in the ranks of the victors whose mind, like those of many others no doubt, was directed in a more peaceful channel. He was Augustus Siebe who, later, invented an "open" Diving Dress and founded our firm in 1819. The " open " dress consisted of a helmet attached to a jacket which reached to the waist, where it was open. Air was supplied to the helmet by means of a force-pump and escaped freely at the diver's waist; it thus worked on the same principle as the diving bell. In 1837 he invented the " closed " Diving Dress and helmet on the principle which is still universally applied to-day.

It is, perhaps, symbolic of our times that this short story should begin in the after-throes of war and end in a similar phase Ironic too, that we, whose whole endeavours have been directed to the means of preserving and saving life, have had to put all we have got into the processes of War. So, if the battle-smoke of Waterloo to the smoke and flame-ridden skies of the London blitzes of 1940-41 be the span of our story, may it not be forgotten that it is with the processes of peace, not those of war, with which we are primarily concerned.

The story of man's efforts to exist under water goes back to the earliest recorded times and is mentioned by Aristotle (360 B.C. and Pliny (A.D. 77). This is no place to trace the history of Diving, but those interested in it will find fuller reference to the historical aspect in " Deep Diving and Submarine Operations " by Robert H. Davis, published by The Saint Catherine Press, London.

Siebe made his first " closed " dresses with metal helmets with windows, supplied with air by means of a rather crude pump and hose, at 5 Denmark Street, Soho, London. The firm moved about eighty years ago to Mason (now Boniface) Street, off Westminster Bridge Road, where it remained until the eventful days of 1941.

The Years of Development and Expansion

It had been recognised that Siebe's invention marked a noteworthy step in the progress of means of working underwater, and his dress was taken into use by the Royal Navy. We still have originals of orders from Their Lords Commissioners of the Admiralty dating back to 1840. Thus started an association with the Admiralty which grew in course of time to the close collaboration which has existed with our Company for so many years.

The latter half of the 19th century saw the improvement of the dress and the means of air-supply, and the year 1879 saw the introduction of an apparatus which came, inevitably, to be closely inter-related with that for diving. This was the self-contained breathing apparatus, using oxygen and a carbonic acid gas (CO_2) absorbent, designed by Henry Fleuss in association with our firm who made the apparatus. The toll of human life caused by disasters in the crudely-equipped colleries of those days called for some safe method of entering atmospheres laden with noxious gas or deficient in oxygen. It was this problem that the apparatus solved and it was used successfully at the Killingworth Colliery disaster in 1880.

As with so many other innovations an inherent conservatism prevented its general adoption for a considerable number of years. In 1902, however, Sir (then Mr.) Robert H. Davis, who entered the firm in January, 1882 and is its present active head, having faith in its possibilities, resuscitated it and in collaboration with Fleuss, who for some years had retired from this field of work, improved and developed the design. This led, some years later, to the introduction of the original " Proto " and " Salvus " apparatus which were taken into use by many collieries and were to do much work of vital importance in the 1914-18 War. It is not without justification, therefore, that we take pride as a Company in being the pioneers in this field. A detailed account of the evolution of breathing apparatus is to be found in " Breathing in Irrespirable Atmospheres " by Robert H. Davis, published by The Saint Catherine Press, London.

The principles used in this apparatus have been equally applicable to the solution of the diver's breathing problem and in 1882 our self-contained Diving Dress was first used by our then chief diver, Alexander Lambert, under practical conditions in the flooded Severn Tunnel operations. Once again we were to experience the same prejudice and distrust which, with few exceptions, seemed to greet the introduction of improved methods and appliances. In general the diving fraternity in the past has not been one given to the ready acceptance of new ideas, and so a long period elapsed before the self-contained Diving Apparatus was given full recognition. In fact, it may be said that it took the recent War to bring about the fuller adoption of this principle in Diving. The varied types of underwater apparatus made by us and used by the Royal Navy in the 1939-45 War, to which we refer later, were all based on the same breathing method established by Fleuss and Siebe, Gorman & Co., sixty-seven years ago.

The War of 1914-1918

In 1914 the impact of World War affected us as it did so many millions of others. Inevitably, the introduction of poison gas into warfare impinged on the special sphere of a firm like ours, and so a part of our War effort was directed to the production of gas-masks and respirators. Underwater warfare had not then been developed to the degree it attained in the recent War and so we were not called upon to produce the variety of special underwater equipment adopted during the years 1939 to 1945. It is of interest, however, to record that in 1915, Sir Robert Davis designed and patented a " Two-man " submarine fitted with a special chamber from which the crew could emerge under water in specially designed self-contained dresses, for the purpose of

underwater attack on enemy vessels. This, however, was before its time as the trend was for larger, not smaller, submarines and it was not until the recent War that a type of craft on these lines was introduced to naval warfare.

The use of aircraft at high altitudes in the first Great War posed another breathing problem particularly the concern of Siebe, Gorman & Co.; and saw us developing and manufacturing the oxygen breathing apparatus for High Altitude flying. We had, before the War, carried out some research in this direction and had the only experimental low pressure chamber in the country. In the early stages of the war, therefore, it was put to frequent use by the Air Ministry.

Salvage operations on sunken ships played an important part both during and after the War. One of the most notable of these, in which our diving apparatus was used, was the recovery of gold to the value of £5,000,000 from the White Star Liner " Laurentic," a converted armed cruiser, which had been sunk in 1917 by enemy mines off the Irish Coast. Others, of course, were the raising of the scuttled German warships at Scapa Flow.

In this, the 1914-18 War, we gained our first wound-stripe. As we were to learn twenty-odd years later to our cost, to have our works in close proximity to Waterloo Station is not always advantageous. One night in 1917 a delayed action bomb dropped over the roof of our drawing office but, providentially, hit the top of a flag-staff first and, insteading of exploding inside the building, went off just above the roof coping stones. That, anyhow, seemed to be the only explanation of a bomb with a delayed-action fuse, exploding where it did. Luckily, therefore, we got away without any casualties and nothing more than a badly damaged roof and broken windows.

The Inter-War Years of Progress

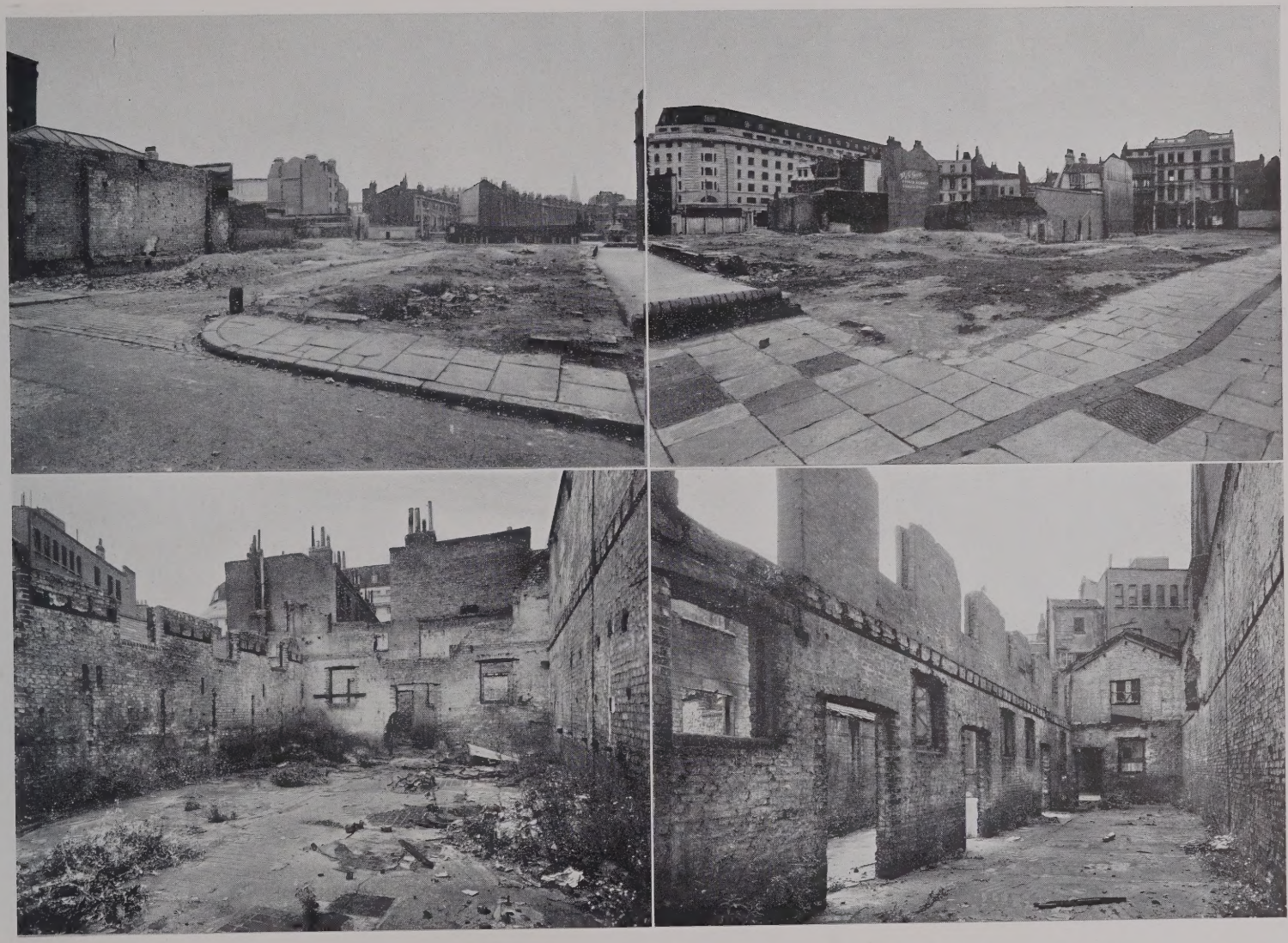
The inter-war years saw us back at our normal function and the task of research and experiment for the improvement and innovation of all types of breathing equipment whether for use under water or in air. In 1922, the Everest Expedition was equipped with special oxygen apparatus, as were subsequent expeditions. Haldane-Davis High Altitude suits and oxygen Breathing Apparatus were supplied for the aeroplane flights in which Swain and Adam broke the altitude records in 1936 and 1937 respectively.

Varied and strange are some of the demands made on us, from that of the man who required a special breathing apparatus for the barrel in which he proposed to go over the Niagara Falls to that of the individual who wished to be buried under the sea-bed and requested our assistance in the construction of a suitable type of coffin !

Much time was devoted in these peaceful years to the problems of increasing the depth at which a diver could work without the danger of becoming affected by compressed air illness. This, perhaps, is an appropriate place to introduce the names of three men, eminent in their respective spheres, who have been valued and close associates of ours over many years : the late Professor J. S. Haldane, C.H., F.R.S., M.A., M.D., famous physiologist, brother of the statesman, Lord Haldane, and father of Professor

SITES OF FORMER INSTRUMENT, ENGINEERING, BREATHING APPARATUS AND GAS MASK-WORKS, DEVONSHIRE GROVE, LONDON, S.E.

Destroyed by enemy action, September and October, 1940.

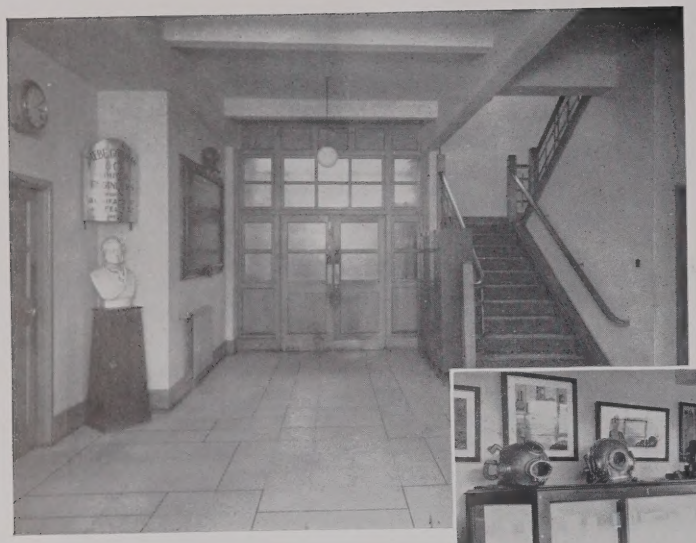


SITES OF FORMER DIVING APPARATUS AND ENGINEERING WORKS, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

Destroyed by enemy action, May, 1941.

"NEPTUNE" WORKS

DAVIS ROAD, TOLWORTH, SURREY



Main Entrance Hall, "Neptune" Works. (Bust of Augustus Siebe on left).

A Section of the Main Showroom and Museum.

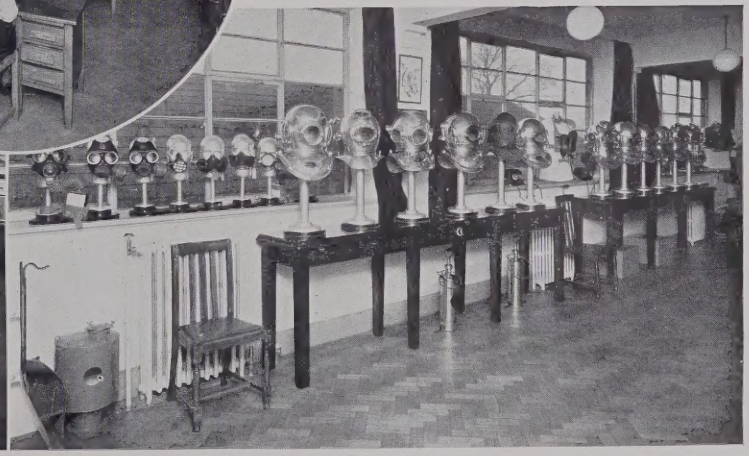
The Board Room.

Accounts Office.

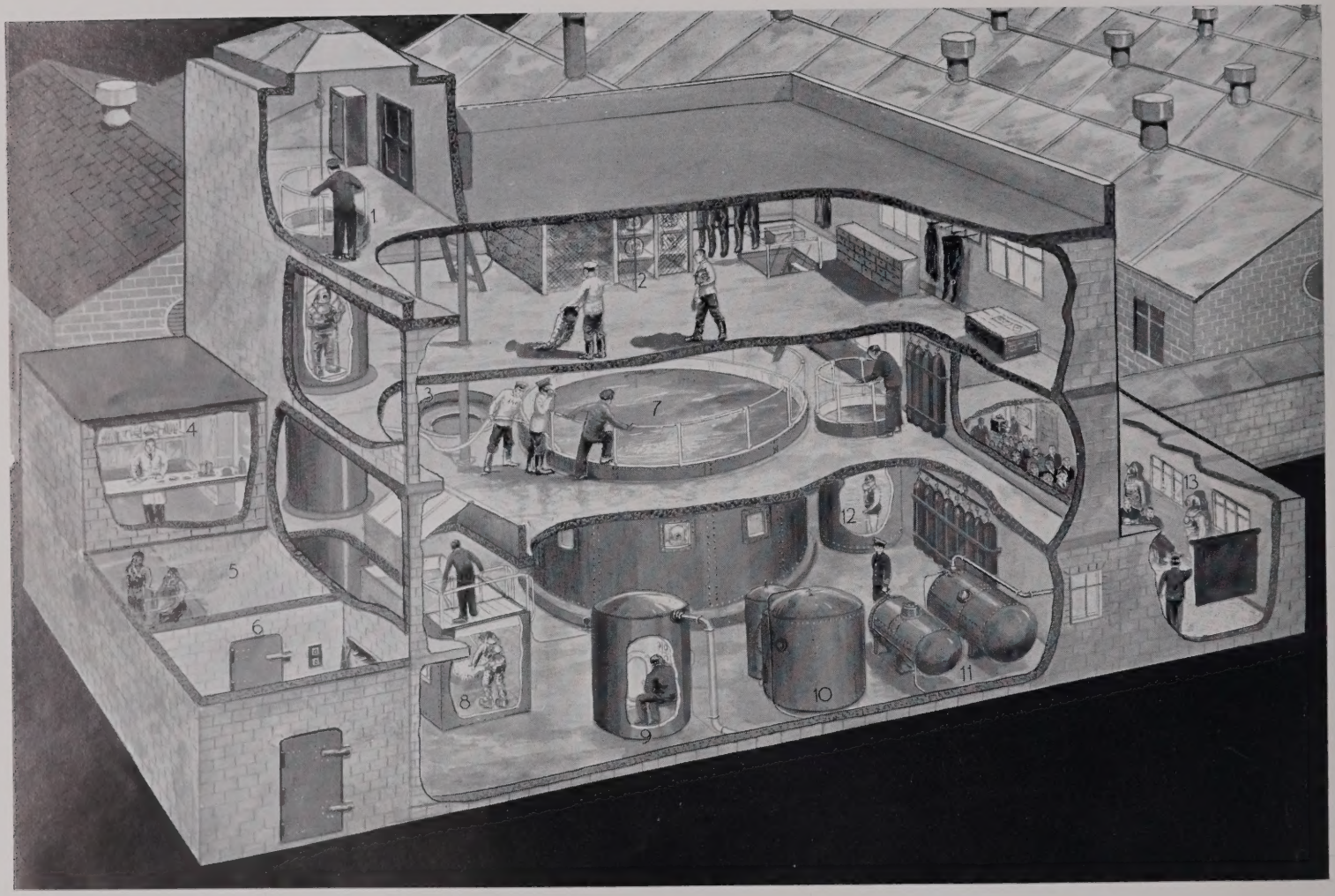
Drawing Office.

Correspondence Office.

Main Showroom.



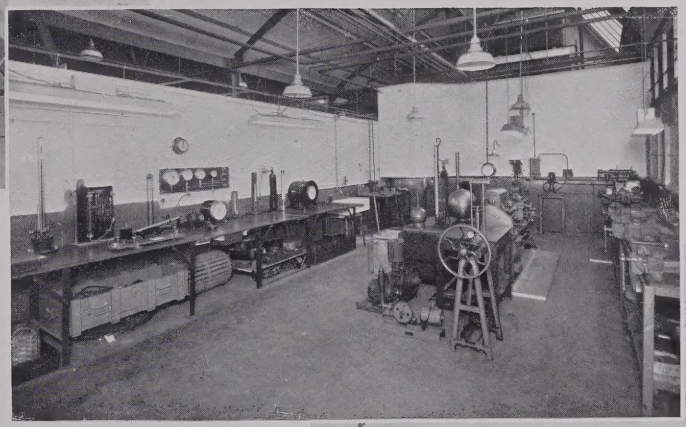
Main Showroom.



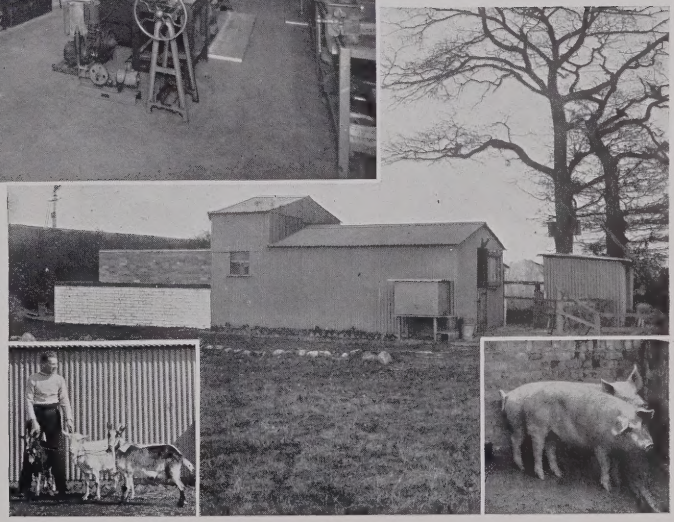
A DIAGRAMMATIC VIEW OF THE RESEARCH AND EXPERIMENTAL DEPARTMENT

1 *Deep Diving Tank.*
2 *Stores.*
3 *Deep Diving Water and Air Pressure Chamber.*
4 *Laboratory.*
5 *Poison Gas Chamber.*
6 *Gas Chamber Lock.*
7 *Large Diving Tank.*
8 *Under Water Cutting and Welding Tank.*
9 *High Altitude Chamber.*
10 *Pressure Chamber with Air-lock.*
11 *Horizontal Pressure Chambers.*
12 *Small Diving Tank.*
13 *Lecture Room.*

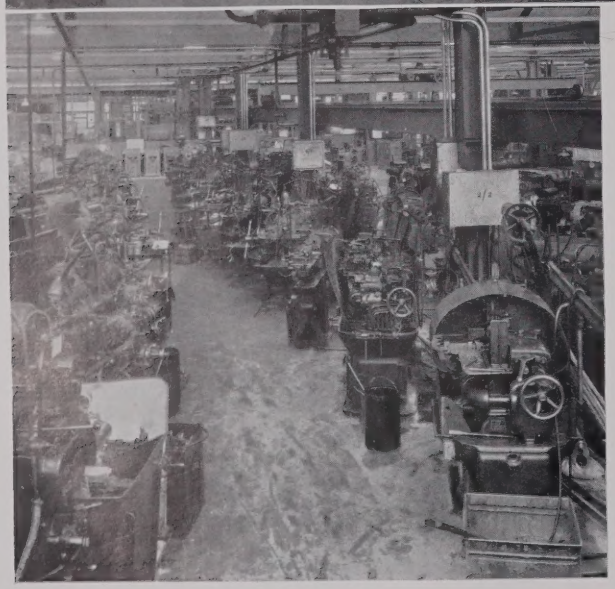
The Chemical Laboratory.



The Mechanical Laboratory.



Goat House and Pig Sties (insets : some of the subjects for experiment).



TOP: *Fitting and Assembly Section* (Instruments).

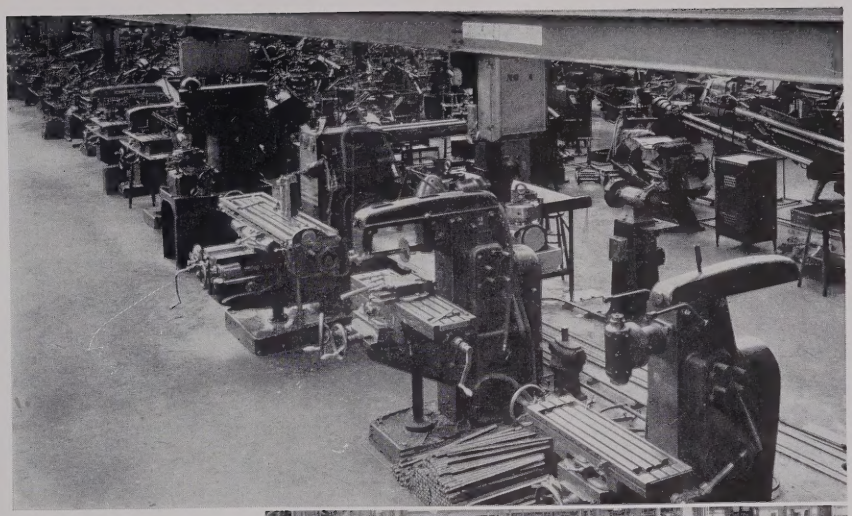
BOTTOM (left): *A part of the Capstan and Automatics Section.*

BOTTOM (right): *Fitting and Assembly Section* (Engineering).

TOP: *Milling Machine Section.*

BOTTOM (left): *Light Milling and Drilling Section.*

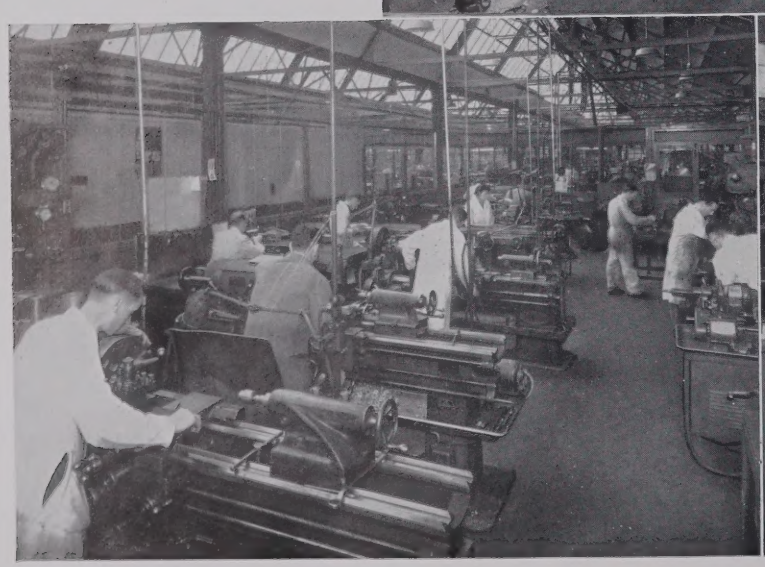
BOTTOM (right): *A part of the Capstan Section.*



TOP : *Helmet Fitting and Assembly Section.*

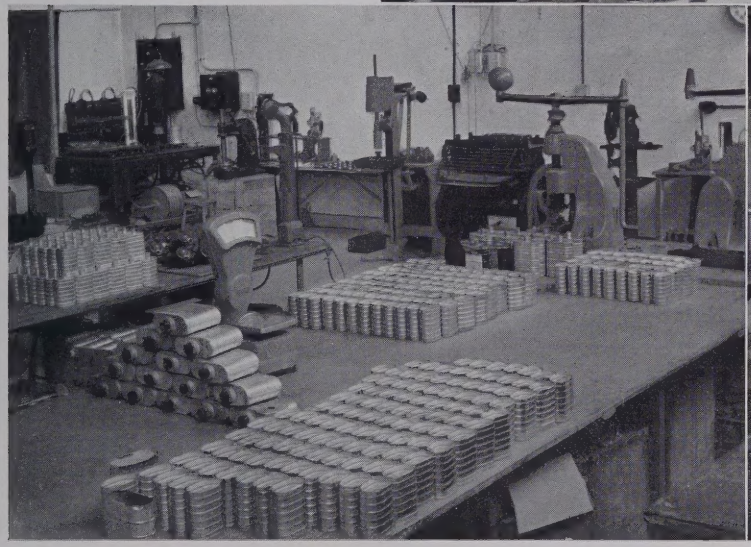
BOTTOM (left) : *Tool Room.*

BOTTOM (right) : *A Tool Store.*



TOP : *Wood-working Section.*

BOTTOM (left) : *Chemical absorbent Canister-filling and Testing Section.*

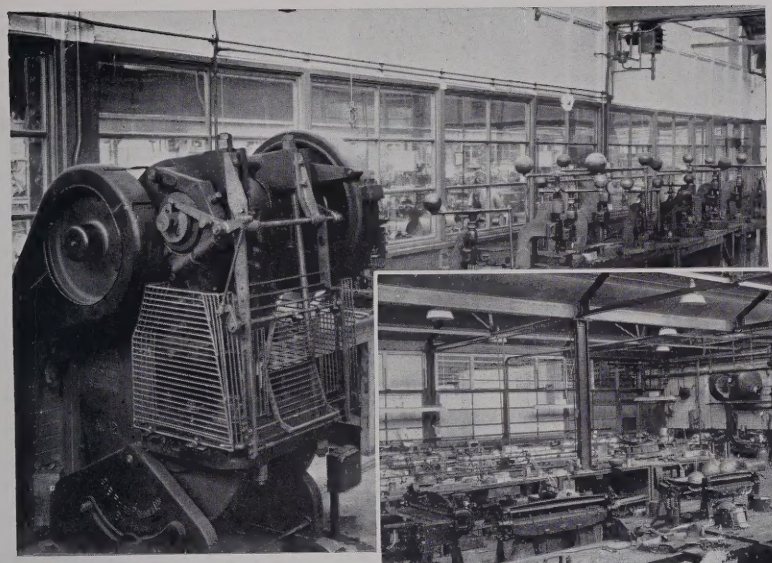


BOTTOM (right) : *Oxygen Cylinder Valving and Filling Section.*

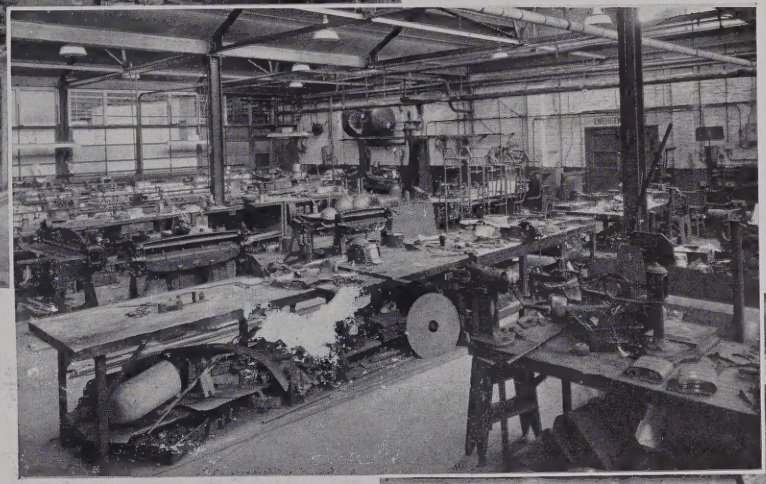
TOP : *One of the Diving Dress Making Shops.*

BOTTOM (left) : *Sewing Machine Section.*

BOTTOM (right) : *Breathing Apparatus Assembly Section.*



Sheet Metal Section (Presses)



Sheet Metal Section.

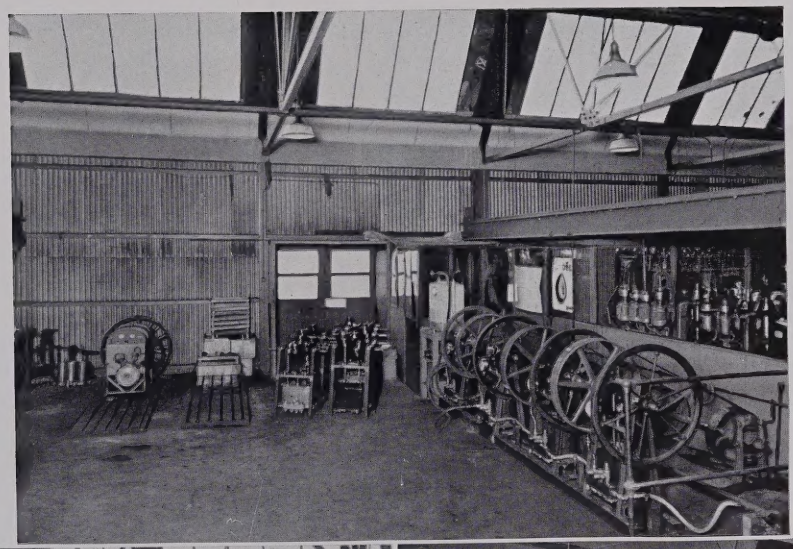
Coppersmiths Shop.

TOP : *Plating Shop.*

BOTTOM (left) : *Paint spraying Section.*

BOTTOM (right) : *Grinding and Polishing Section.*

TOP : *One of the Pump-testing Beds*



BOTTOM (left) : *Inspection Section.*

BOTTOM (right) : *Testing Section.*

Diver's Telephone Signal Line Fitting Section.

Metal Store No. 1.

One of the General Stores.

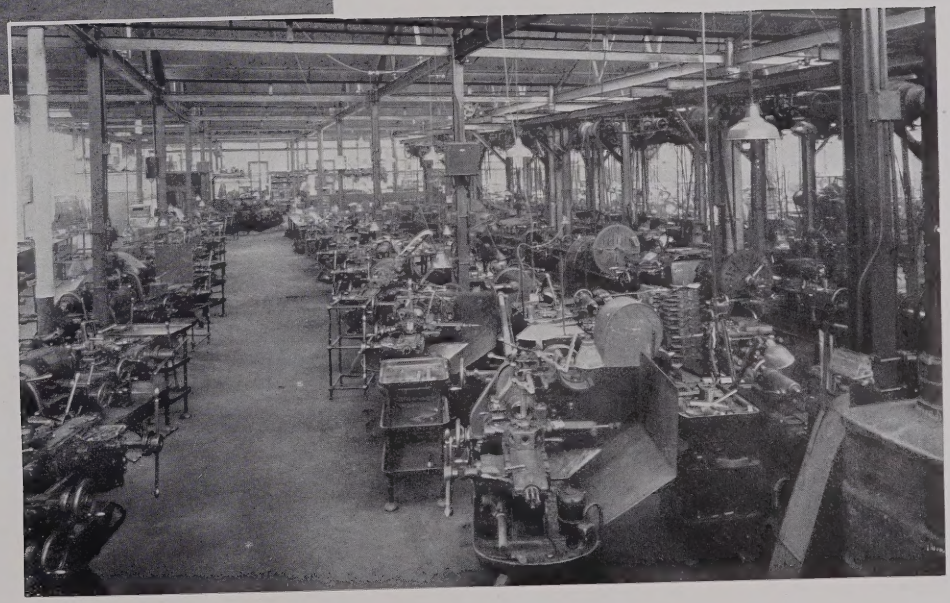
A section of one of the Stores.

A section of the finished Stores.

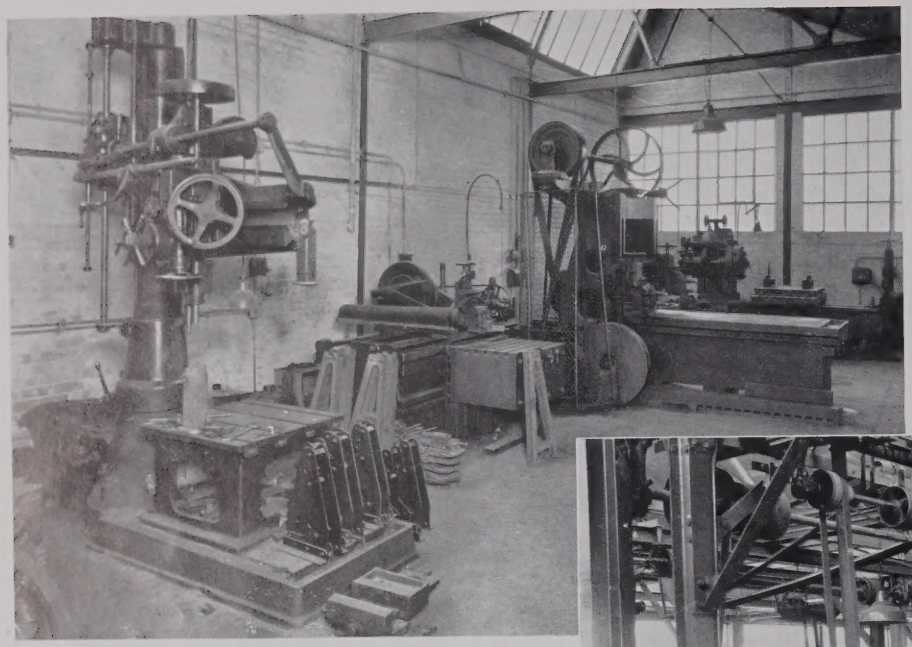
Metal Stores No. 2.

THE CANTEEN—"NEPTUNE" WORKS

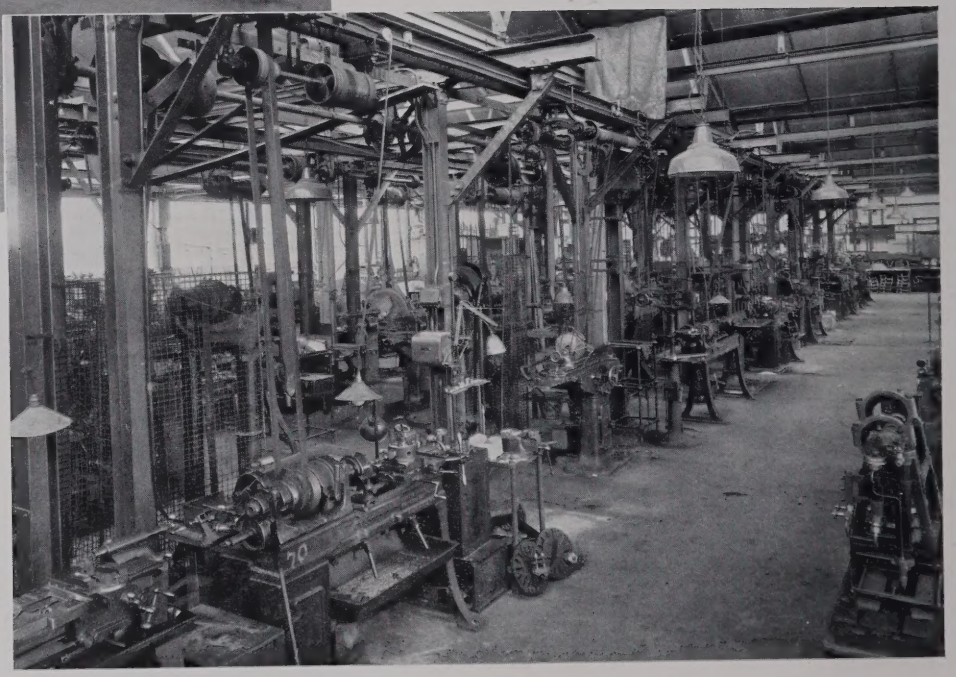
Oakcroft Road Branch Works, Tolworth.



Machine Section No. 1,
Oakcroft Road Branch Works.



Planing and Boring Section,
Oakcroft Road Branch Works.



Machine Section No. 2,
Oakcroft Road Branch Works.

J. B. S. Haldane, F.R.S., who has also worked in association with us ; Sir Leonard Hill, F.R.S., M.B., LL.D., the eminent physiologist ; and Captain G. C. C. Damant, C.B.E., R.N.(ret'd), expert on Diving problems.

In 1907 the Admiralty had appointed its first Deep Diving Committee of which the late Professor J. S. Haldane was the physiological member. Haldane, with Damant working with him and doing much of the actual underwater experimental work, evolved the stage system of decompression which set 210 ft. as the limit of depth at which Naval divers should work. In this they were assisted by the late Mr. A. Y. Catto, R.N.

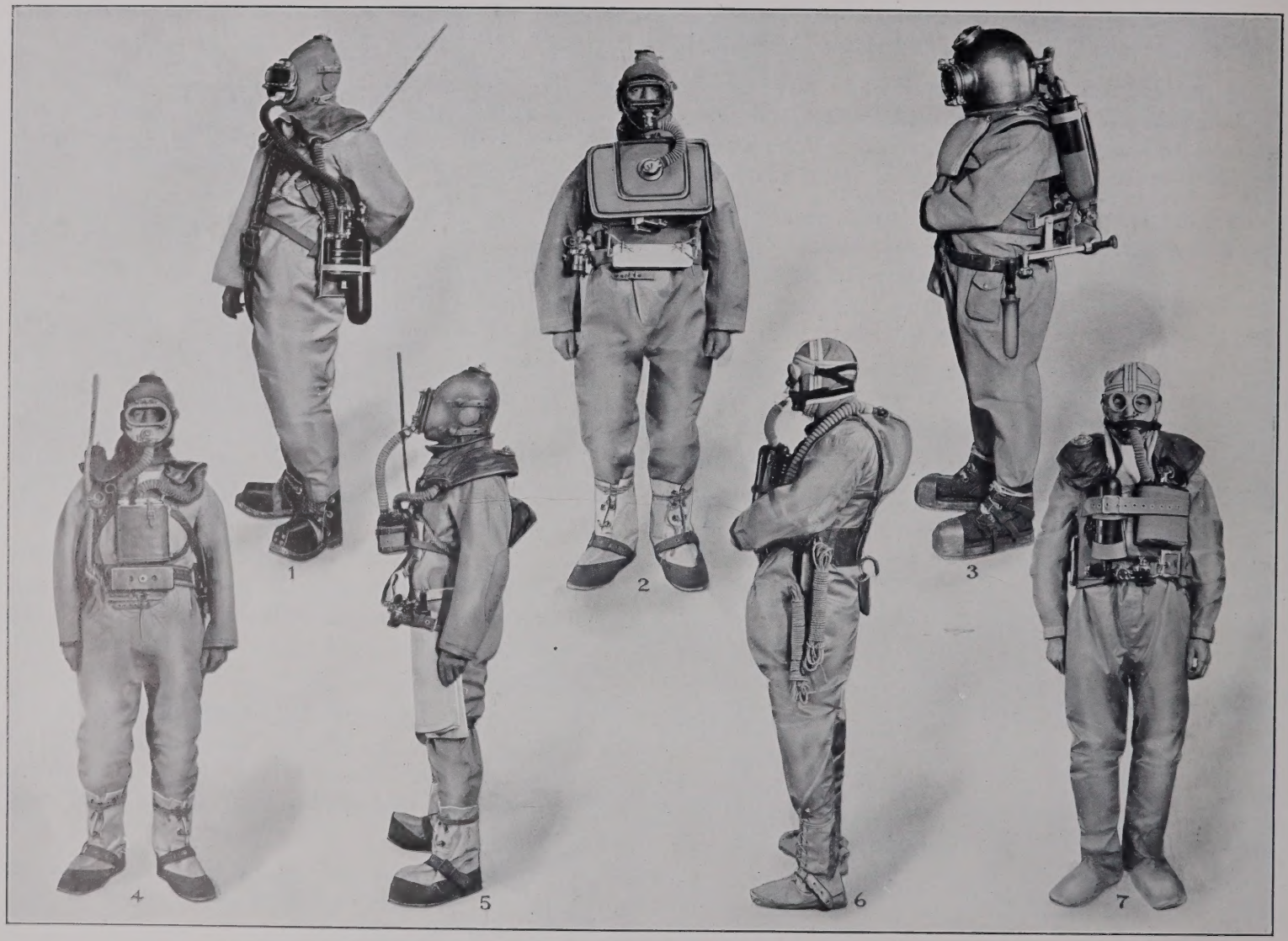
A second Deep Diving Committee was appointed by the Admiralty in 1930 on which Sir Robert Davis and Sir Leonard Hill sat as members. The experimental work in this connection was carried out in our experimental and research department, under the control of Captain Damant (whom Sir Robert Davis had asked to join him in the work), assisted by Mr. R. W. Gorman Davis. This resulted in the calculation and production by Damant of new Decompression Tables (copyright of Siebe, Gorman and Company, Limited) enabling the official maximum depth for divers in the Royal Navy to be increased to over 300 ft., In connection with the same problem, R. H. Davis's Submersible Decompression Chamber was introduced. This enabled the diver ascending from a great depth to carry out the greater part of his decompression in comparative comfort, and lessened the wearisome and exacting period spent hanging on to the shot-rope in cold water as he had to do under the old method.

In a short review such as this, space does not permit us to enlarge on other aspects of the problem of increasing the depth at which divers can work. Armoured diving dresses and the use of helium and oxygen, hydrogen and oxygen and nitrogen and oxygen for the diver's breathing mixture all play their part in varying degrees.

The problem of providing some satisfactory means of escape for the crews of sunken submarines had taxed many brains for years. Various methods had been tried and then Sir Robert Davis's Submarine Escape Apparatus was produced by us and adopted by the Royal Navy and a number of foreign Navies. It was a gratifying moment when we heard that the first lives had been saved by means of it when H.M. Submarine " Poseidon " went down in the China Sea in 1931. We cannot yet say how many escaped by this means during the recently-concluded War.

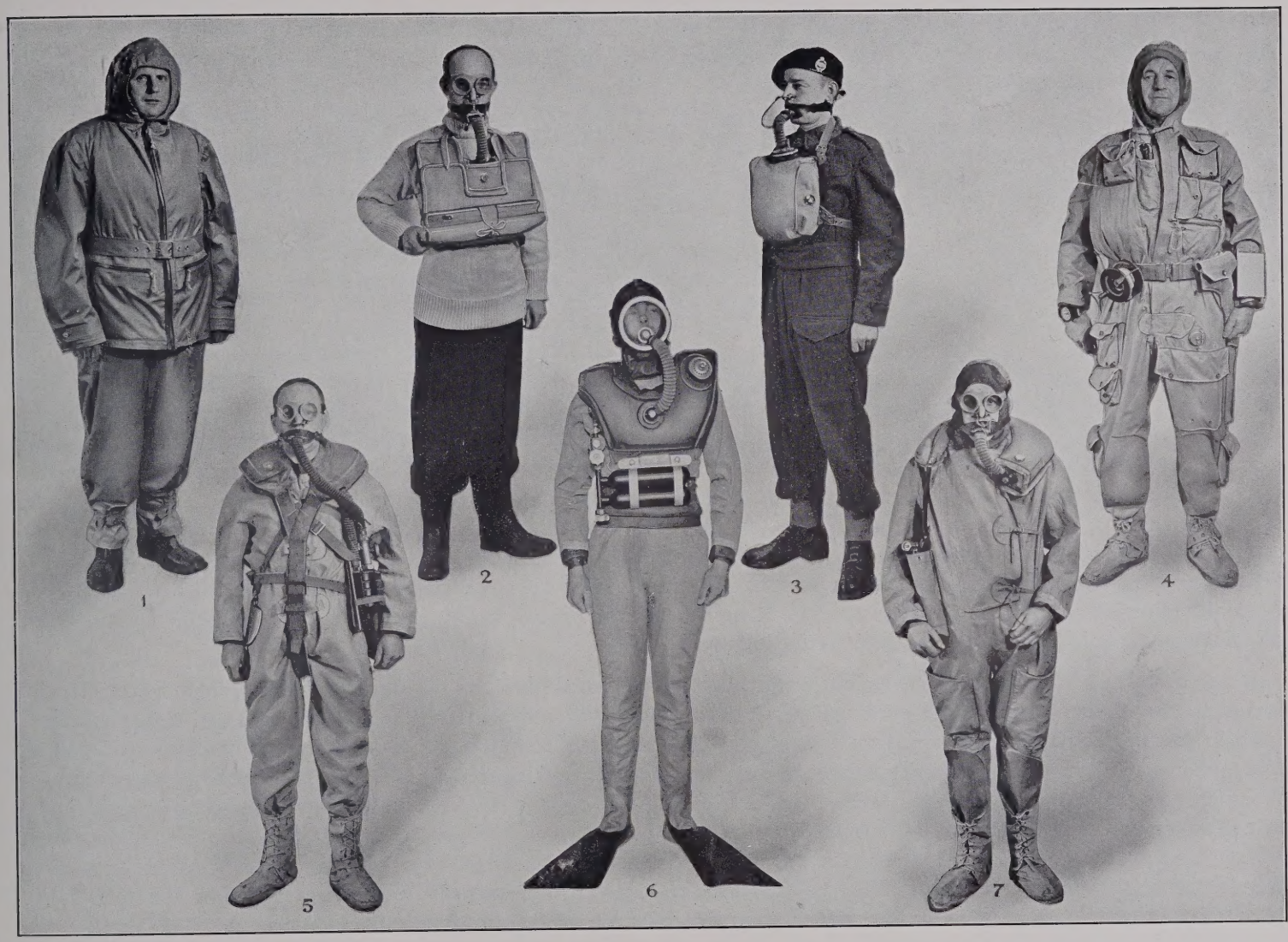
The growth of industry and the introduction of new manufacturing processes led to an increased demand for protective devices for workers and in many cases legislation insisted on their provision. The field in which breathing apparatus was taken into regular use was widened and we find it becoming an essential part of the equipment of Chemical Works, Oil Wells, Gas Works, Sewerage Works, etc. Improvements were made to our " Proto " and " Salvus " sets, used by the great majority of Mine Rescue Brigades and Fire Brigades in this country, and other types were introduced.

Protective clothing and devices of all descriptions for the health, comfort and safety of workers played an increasingly important part. The increased use of oxygen for resuscitation purposes led to improved methods of its administration. Our " Novita " set had been widely used in the 1914-18 War and a further design, the " Novox," was now produced.



SPECIAL EQUIPMENT FOR UNDERWATER WARFARE—1939-1945.

1 *Shallow-water Diving Suit embodying "Salvus" A.N.S.*
2 *Suit worn by Diver of Midget Submarine and Crew of "Human Torpedo."*
3 *Mine Recovery Suit of non-magnetic material.*
4 *"P" Party Mark II Suit for clearing mines from beaches, harbours, etc.*
5 *"P" Party Mark I Suit for similar work.*
6 *Amphibian Mark I Suit for shallow-water work—also used by Army in rivers and canals.*
7 *Amphibian Mark II Suit for shallow-water work and special operations.*



OTHER EXAMPLES OF SPECIAL EQUIPMENT USED DURING AND SUBSEQUENT TO THE WAR 1939-1945.

1 *Mobile Flotilla Unit protective suit for inshore and patrol work.*
2 *Davis Submarine Escape Apparatus.*
3 *Army Tank Escape Apparatus for amphibious operations.*
4 *Combined Operations Suit.*
5 *Beach Recovery Suit as used in Normandy and other landings.*
6 *Swim Suit or "Frogman."*
7 *Special suit for Watchkeeper of Midget Submarine.*

The "Drinker" apparatus, more commonly called the "Iron Lung," was first brought to this country by us. It had been designed by Dr. Philip Drinker of Harvard University and, with his concurrence, was modified and improved and then manufactured by the Company. Its success in prolonged artificial respiration has been well-proved.

To deal exhaustively with all our activities during the inter-war years is not our purpose, but we have, perhaps, given some idea of their wide range.

The War of 1939-1945

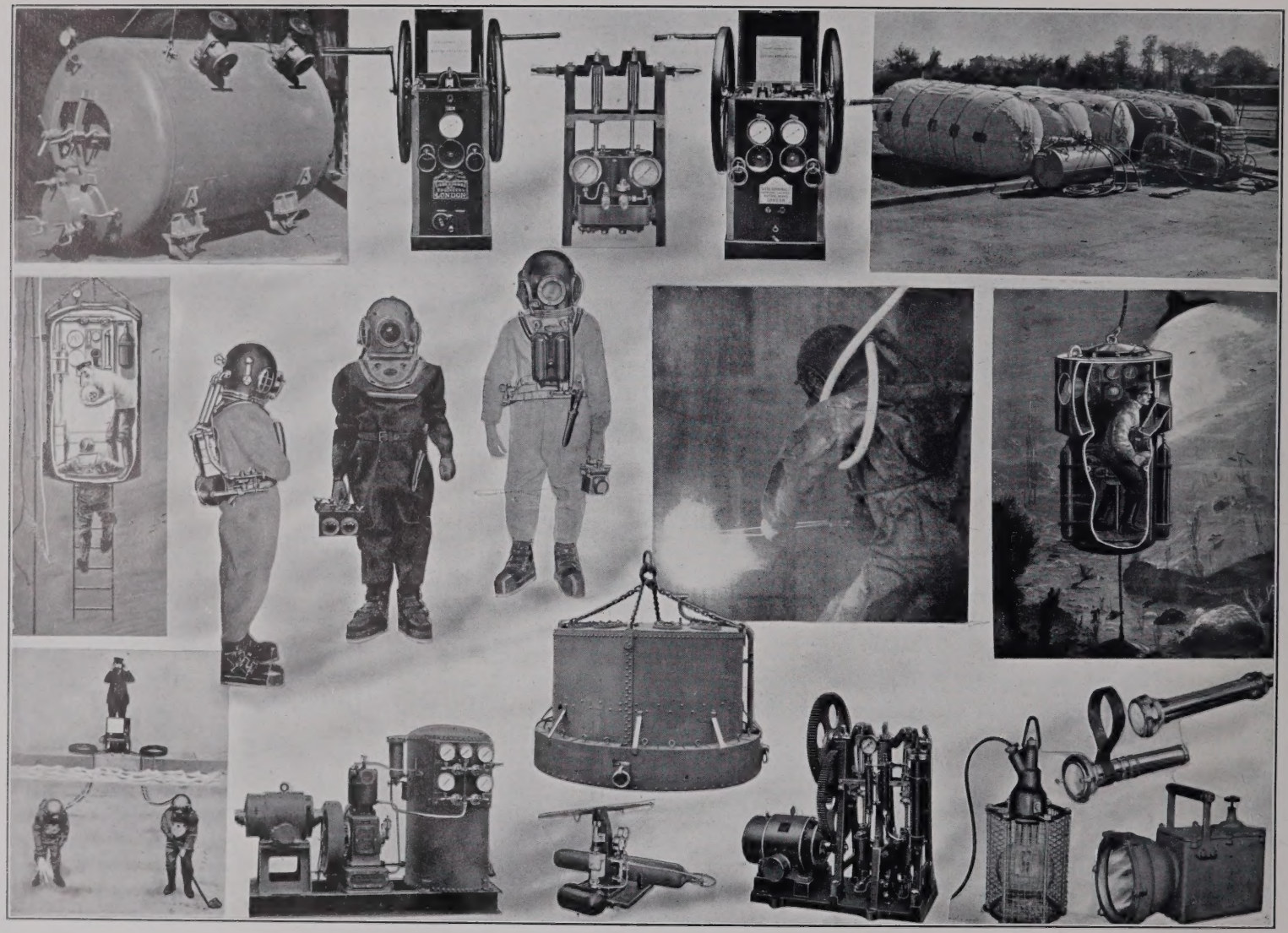
In 1938, when rumours of War were rife, it seemed that the time had come to consider the removal of our works to a less vulnerable locality. In 1939, therefore, work commenced on a new factory at Tolworth, Surrey.

September 3rd, 1939, found us then with all our production going on in our London works, an incomplete factory at Tolworth and heavy demands from the Admiralty and Air Ministry pouring in. In order to comply with these demands we acquired a new but smaller factory in close proximity to that under construction at Tolworth. It was indeed fortunate that we did so, for before the latter had been completed, the so-called "phoney" War ended and Goering's Luftwaffe descended on London. In September, 1940, we lost our instrument works, in October, 1940, the gas-mask Works, and, finally, in May, 1941, our main engineering, diving apparatus works, offices, etc., in Westminster Bridge Road. Thus, a clean sweep was made of all our pre-war works. It does not need much imagination to picture the effect of the loss of machine tools, special instruments, plant, etc. coming as it did at a time when every ounce of effort was needed to further war production. The new works were almost completed by the end of 1940 and by exerting every effort the losses in machinery and tools were made good and production kept going with comparatively little delay in meeting Government demands—demands, incidentally, which called on us for quantities of diving apparatus, breathing apparatus of various types and many special instruments and appliances far surpassing in numbers any we had been called upon to produce before.

In one respect we were fortunate in that our research and experimental plant was not completely destroyed and, after repairs and replacements, was again got into working order at the new factory. The plant included our experimental diving tanks and specially-constructed chambers for experiments at high and low pressures in atmospheric air, oxygen, nitrogen, hydrogen, helium and mixtures of these gases. This department of ours, which owed its existence to Sir Robert Davis over 40 years ago, was the only one of its type in the country, and we feel that it is not too much to say that it was lucky from a national point of view as well as our own, that it survived. We were glad to place it, voluntarily, at the disposal of the Admiralty for its Experimental Diving Unit for the period of the War and it was here that the many and novel types of apparatus for underwater warfare were designed, tested and perfected. Here, too, were trained many of the men who were to use them and subsequently, to perform deeds of superb heroism in underwater operations of great hazard, for which many decorations, including Victoria Crosses and George Crosses, were awarded.

A DIAGRAMMATIC IMPRESSION OF UNDERWATER ACTIVITIES.

1 *Blowing up a wreck.*
2 *Diver's Recompression Chamber on Salvage Vessel.*
3 *Diver's Boat and Pump.*
4 *Man supported on surface by Davis Submarine Escape Apparatus.*
5 *Depth Charges.*
6 *Davis "Two-man" Submarine.*
7 *Pontoon.*
8 *Salvage Vessel.*
9 *Air-lock Diving Bell.*
10 *Diver laying concrete block.*
11 *Diving Bell.*
12 *"Frogman."*
13 *Submarine Grab.*
14 *Salving sunken Bomber with Inflatable Pontoons.*
15 *Deep-sea Observation Chamber.*
16 *Torpedo.*
17 *Paravane.*
18 *Two-man Submarine (Human Torpedo).*
19 *Lifting Magnet.*
20 *Observation Chamber with Lamps.*
21 *Metal Diving Armour.*
22 *Spherical Observation Chamber.*
23 *Pearl Diver.*
24 *Naked Sponge Diver.*
25 *Sponge Diver in Dress.*
26 *Diver with Explosive charges.*
27 *Davis Submersible Decompression Chamber.*
28 *Observation and Diving Chamber.*
29 *Prolonged Submersion Chamber.*
30 *Mine Recovery Work.*
31 *"X"-class small submarine.*
32 *Davis Submarine Escape Apparatus.*
33 *Wreck.*
34 *Pontoons for raising wreck.*
35 *Submarine High Power Lamp.*
36 *Diver using Submarine Drill.*
37 *Diver using Oxy-Hydrogen Cutter.*
38 *Diver with Submarine Camera and Lamp.*
39 *Self-contained Diving Suit.*
40 *Submarine Escape Lock Hatch.*
41 *Crew escaping from sunken submarine.*



EXAMPLES OF SOME OF THE COMPANY'S PRODUCTS FOR UNDERWATER WORK.

EXAMPLES OF SOME OF THE COMPANY'S PRODUCTS FOR SAFETY IN IRRESPIRABLE ATMOSPHERES, INDUSTRY, SHIPPING, AVIATION, ETC.

This is not the place to describe in every detail the varied types of apparatus we made for this form of warfare although, in passing, it is of interest to note that the breathing devices used in them were all based on systems well established by our Company during the previous sixty years.

The adage " There is nothing new under the sun " seems to apply to devices looked upon as the most modern, even to those devised for present day underwater warfare. The " swim-suit," popularly known as " The Frog-man " is an instance of this and descriptions and illustrations of its fore-runner are to be found in publications of the 17th century.

The following rather bald statement of the main items comprising our production for the War effort will perhaps give a general idea of what it embraced :—

FOR THE ADMIRALTY.

Deep Sea Diving Equipment.

Davis Submarine Escape Apparatus.

Special self-contained apparatus for midget Submarines and " Human Torpedoes."

Special self-contained Dual-purpose apparatus for use under water and in poisonous atmosphere.

Special self-contained Shallow-water diving apparatus.

Special self-contained apparatus for Mine Recovery operations.

" Novox " Resuscitating Apparatus.

Depth Gear and other Torpedo mechanisms, etc., etc.

FOR THE MINISTRY OF AIRCRAFT PRODUCTION.

Various types of Oxygen Breathing Apparatus for Airmen flying at High Altitudes, and other instruments.

FOR THE MINISTRY OF SUPPLY.

" Proto " self-contained Breathing Apparatus for use, amongst others, by the Army.

" Salvus " self-contained Breathing Apparatus for use by Army, N.F.S., etc.

" Novox " Resuscitating Apparatus.

" Iron Lung " and Bragg-Paul Apparatus for prolonged artificial respiration.

Amphibian Tank Escape Apparatus.

We venture to claim, therefore, that never before has so much apparatus for artificial breathing—whether *under water*, *in the air*, or *in poisonous atmospheres* been produced by one firm ; and this in face of every hindrance by the enemy.

Conclusion

And so we return to more peaceful paths, thankful that we have played our part in the overthrow of Naziism and more thankful still that we are now able to devote our endeavours once again to those utilitarian and humanitarian purposes for which we are designed. We are proud of our record which for well over a century has led the field in all matters pertaining to the production of diving equipment and breathing apparatus, and the advancement of knowledge in its use. We feel that sufficient acknowledgement of the quality of our work was discovered by a member of our staff when visiting Germany as recently as 1946. The German chief diver at Kiel Harbour was using a captured set of Siebe, Gorman and Company's diving apparatus in preference to that of German manufacture !

The illustrations which are the main feature of this brochure show, we think, that we are well equipped to maintain our reputation as leaders in the production of

" EVERYTHING FOR SAFETY EVERYWHERE

ON LAND, SUBMERGED AND IN THE AIR "